Deploy Software Updates for Linux Devices

BoF session | August 2019
Embedded Linux Conference/OpenIoT Summit
Mender provides an open source whole product offering:
- Fully API based, open source with no vendor lock-in
- Built-in security and robustness
- Client-server OTA software manager
- Community-backed (Mender Hub)
- Software quality and reliability with 80% test coverage
- Complete set of tools, documentations and support
- Options: open source, Hosted Mender, Mender Enterprise

About Mender

Mender Customers

Mender Partners

Mender offers a suite of tools and solutions for secure and robust software updates, backed by partnerships with leading brands and companies worldwide.
Challenges With Homegrown OTA Software Update Mechanisms

- Time consuming
  - Average 6-12 months
- Costly
  - In hundreds and thousands of dollars
- Lack in-house competency
  - Leads to a mediocre solution with devices at risk of being hacked or bricked
- Adds complexity to product development cycle
  - Jeopardizes time-to-market and product release deadlines
Mender’s Focus

List of requirements needed to have a secure and robust OTA manager is substantial!

We believe the key elements for a successful implementation are:

- Built-in security
- Robust update process
- Fleet management
- Server management
- Community-backed
Why OTA Updates Are Increasingly Crucial

Growing list of malware, including Mirai, Hajime Brickerbot, Shishiga targets insecure Linux devices

“If companies do not build in protections to prompt new users to create strong passwords and ensure customers patch security vulnerabilities, they are not only risking brand reputation, regulatory action and the cost it takes to recall thousands of products, they are risking the health of the digital economy and the security of any nation in which such an attack takes place.” *

Robustness Is Not Optional

Manufacturers taking shortcuts on robustness are learning the hard way

'Smart' lock recommended by AirBnB is BRICKED by a software update leaving guests unable to access their rentals

- The LS6i device allows owners to remotely lock and unlock their doors
- But a software update last week means users can no longer unlock the device
- Users have been given two options to fix the device, but both take 5-18 days

Mender would have protected against this:

- Installs restricted to defined device types.
- Built-in automatic rollback.
- Post-install checks:
  - Devices unable to connect to the management server will rollback
  - Scripting interface for application-specific update sanity checking.
Tesla hacked by security researchers in September 2016

“Cryptographic validation of firmware updates is something we’ve wanted to do for a while to make things even more robust,” says Tesla’s CTO JB Straubel. Straubel notes that Tesla has been working on the code-signing feature for months but accelerated its rollout when the Tencent hackers reported their attack. *

Generic Embedded Update Manager Workflow

1. Detect update (secure channel)
2. Compatibility check
3. Download (secure channel)
4. Integrity (e.g. checksum)
5. Authenticate (e.g. signature)
6. Decrypt
7. Extract
8. Pre-install actions

- Must-have
- Environment-specific

9. Install
10. (Re)Start*
11. Sanity checks
12. Post-install actions

- Failure recovery (e.g. roll back)

*E.g. reboot, restart service, start container
Mender Overview

Mender’s prime directive: robust and secure OTA updates

Solutions:
- Open source
- Hosted Mender
- Mender Enterprise
- Professional Services

Key features:
- Support for updates such as applications, packages, containers, files, bootloaders, and proxy deployment
- Full image atomic updates
- Full control of installing and updating any software
- Brick-free updates with atomic rollback functionality
- Robust and failsafe support with a dual A/B partitioning
- Secure TLS client-server communication with code signing
Mender | Other Capabilities

- Compression to save bandwidth
- Simple integration to existing Yocto configurations
- Raw Flash or SD/MMC/eMMC support
- Scripting interface to adapt to application-specific use cases.
- Microservices API-based architecture allows simple adaptation to custom requirements.
- Low system overhead
Mender Differentiated Offerings

- Fully open source with no vendor lock-in
- Client-server OTA update management solution
- Community-backed (Mender Hub)
- Easy to integrate, manage, and deploy with intuitive web UI
- Software quality and reliability with 80% test coverage
- Complete set of tools, documentations and professional technical support
The only online community dedicated to enable OTA updates with Mender on any board and OS!
(40+ board integrations)
Mender Architecture With Update Modules

- Any type of update
- Update actions implemented in modules
- Popular application update types supported out-of-the-box

**Diagram:**
- Mender Artifact → Mender Client 2.x → Update Module
  - File system Image
  - File(s)
  - Containers
  - Proxy firmware
  - OS A/B image
Key Features and Benefits - System Updates

Atomic rollback support with a dual A/B partitioning layout
Allows recovery and keeping device operational when updates fail for any reason

Consistent full image atomic updates
Avoids inconsistencies from partial updates caused by interrupted package installations

Secure TLS client-server communication with code signing
Ensures security with end-to-end signing and verification of artifacts for authenticity and integrity
Key Features and Benefits - Application Updates

Application updates
Mender supports “all” kinds of updates

- Packages
- Containers
- Files and directories
- Proxy device deployment
- Full control and customizability

It is very easy to install application-based updates on Debian, Ubuntu and Raspbian OSes with Mender
Mender Enterprise features coming soon

1. Delta updates
   a. Reduce the update file size

2. Phased rollout management
   a. Gradually roll out an update across the device fleet

3. Multi-tenancy
   a. Isolate customer environments

4. Two Factor Authentication

5. Device Filtering
Get started now:
https://docs.mender.io/2.0/getting-started

Join the Mender Hub community:
https://hub.mender.io

Mender on Github:
https://github.com/mendersoftware/

contact@mender.io
https://mender.io/
@mender_io
/company/mender.io
Thank you!

Q & A